School of Aquatic and Fishery Sciences

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Dayofweek, December, 31, 2015

International Council for the Exploration of the Sea

Journal of Marine Science

Dear Dr. Jörn Schmidt,

First, I would like to thank you for considering a resubmission of the manuscript # ICESJMS-2015-571 entitled “Quantifying drivers of gear choice in the US West Coast sablefish fishery to improve future fisheries management”. Second, I thank you and the two anonymous reviews for the helpful comments and I hope you find the revised manuscript much improved. Below you will find you original letter, dated 2015-12-13, where I have inserted replies to each comment and indicate how the comment was addressed.

Should you have any additional questions please feel free to contact me via email at kfjohns@uw.edu. I look forward to comments on the revised submission.

Sincerely,

Kelli Faye Johnson

Attachments:

wcd\_.docx

wcd\_\_figures.docx

wcd\_20151101\_review\_201512??.docx

Original Letter to Mrs. Johnson, dated 2015-12-13:

Dear Mrs Johnson,

I write you in regards to manuscript # ICESJMS-2015-571 entitled "Quantifying drivers of gear choice in the US West Coast sablefish fishery to improve future fisheries management" which you submitted to the ICES Journal of Marine Science.

In view of the criticisms of the reviewers found at the bottom of this letter, your manuscript has been denied publication in the ICES Journal of Marine Science.

The criticism is both on the model as well as the general structure of the paper. However, both reviewers have provided thorough reviews, which are certainly helpful in improving the study and the manuscript.

Thank you for considering the ICES Journal of Marine Science for the publication of your research. I hope the outcome of this specific submission will not discourage you from the submission of future manuscripts.

Sincerely,

Dr Jörn Schmidt

Editor, ICES Journal of Marine Science

jschmidt@economics.uni-kiel.de

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

General comments for authors:

Investigating the economic, ecological, and institutional determinants of bycatch avoidance behavior is an important topic for fisheries research. However, the model in this analysis needs to be more thoroughly motivated in terms of the motivations that are expected to underlie gear choices. Furthermore, the model results need to be assessed more thoroughly, including a discussion of the lack of significance and robustness in the estimated parameters. I am concerned that data series used may lack sufficient observations to produce meaningful model results. If the purpose of this paper is to present a methodology, the manuscript should state this explicitly and then focus on developing a method that is consistent with the conceptual framework of fisher gear choice.

Specific comments for authors:

1. This paper models aggregate trends in gear choice behavior:

“Factors related to fish ecology, economics, and management were used to understand gear choice while landing sablefish …” Page 5 Paragraph 2.

It would be helpful to describe the incentives fishers have to switch gears and the factors influencing those incentives in more detail. Framing fisher gear choices as part of a larger set of decisions that are undertaken to achieve some objective (profit maximization, risk minimization, utility maximization, etc.) might help to better root the empirical model in fisher behavior.

2. The incorporation of socio-economic data into a model of gear choice is a key motivating factor for this paper:

“Integrating data collected from multiple disciplines in a single model facilitates analyzing fishermen behavior from a socio-economic perspective, which is a necessary step forward for all analyses wishing to enable sustainable fisheries” Page 6, paragraph 1.

However, it is unclear how the a priori hypothesized economic model at the bottom of page 11 was developed. Furthermore, all of the included variables appear to be the result of, rather than the determinants of, fisher operational decisions. Thus, these covariates may be jointly determined with the dependent variable, which is also the result of fisher operational choices. Fisher behavior is more likely influenced by fixed vessel characteristics, fisher characteristics (e.g. skill), input prices (wages, fuel, gear), and ex vessel fish species prices. For all model covariates, the authors should present hypotheses as to the sign of the estimated coefficients and describe the hypothesized underlying behavioral mechanism.

3. “In addition to target species TAC limits, management includes bycatch limits for Pacific Halibut, an internationally managed species, and five overfished species …” Page 7 Paragraph 2.

Is data available for species-years when bycatch limits were reached? This could help inform the expected relative influence of bycatch species abundance on fisher behavior. Is halibut bycatch expected to have a significant impact on fisher gear-choice behavior? Why or why not?

4. “As of 2013, 164 vessels held sablefish permits … With six permits having endorsements for multiple gear types: four longline and pot, one pot and trawl, and one longline and trawl.” Page 7, paragraph 3.

Were all of these vessels included in the analysis? How do gear endorsements influence or constrain gear-switching behavior? Please clarify.

5. “…EDC data was summed or averaged by port group for which the each vessel hed the highes ex-vessel revenue for that year” Page 8, Paragraph 3.

This is unclear to me. Consider rephrasing.

6. This study analyzes data aggregated at the port-group level for years 2009-2013. The authors should clarify how the model accommodates the panel-nature of the data.

“… Z is the random effects design matrix (nxq) … Here Zµ allowed for variations among port groups” Page 10, Paragraph 3.

“ … the second parameter of the beta distribution, b, and the parameter governing the presence or absence of ones, (nu), were best modeled as random effects, where random effects were included to accommodate repeated measures across years for each port group …” Page 13, paragraph 3.

Does this imply that the shape of the beta distribution is assumed to vary across port groups but the relationship between coviariates and the dependent variable is assumed constant across port groups? The authors should consider discussing how this specification accommodates variation among ports and how it relates to Equation 1. (define n, p, q, in the specification, show or discuss parameterization of beta regression)

7. The manuscript should describe the data used to estimate the model results presented on pages 29 and 30 in more detail. For example, Page 11, paragraph 3 notes that fixed effects covariates were Z transformed. Are the moments used for transformation from the port or total sample? The authors should consider a descriptive statistics table and at a minimum should report the number of observations in the results table.

8. The specification of Model 5 (Page 11, paragraph 4) is presumably missing the management dummy variable.

9. Page 17, paragraphs 1 & 2: Are risk pools expected to be related to gear switching behavior?

10. The authors should note that bycatch avoidance can be associated with a variety of fisher behaviors, not just through gear-switching (Abbot et al 2015)

11. Table 5 should be modified to include the shape parameters, the standard deviations of estimated parameters and to indicate statistical significance.

12. A more detailed discussion of the model results is warranted.

o In Table 4, the estimated intercept (mean) is not significant at the 0.05 level. What does this say about the precision of the estimates and the reliability of the results?

o In Table 5, the signs and magnitudes of estimated coefficients, including the ecology coefficients, are not robust across models. Discuss the implications for interpreting the results.

Reviewer: 2

Comments to the Author

I have very mixed feelings about this article. I find it both extremely complicated and difficult to follow, and at the same time the results are difficult to interpret. Certainly the authors made a major effort in collecting and analysing many data from various datasets, and test them in an integrated and objective manner. Though, I have read the article several times and I still have troubles figuring out whether it is me who simply did not get the whole point of the analysis (it can well be and I can accept that!), or that there were a number of fundamental flaws in the approach and its interpretation, see the suite of my comments and questions throughout. A lot of the introduction and discussion is about “gear choice”, “risk pool”, “governance” etc, whereas the actual analysis doesn’t relate much to this, or only indirectly. I found a gap between the mentioned objectives of the study, and the actual analysis.

I have been missing a clearer starting point and thread for the whole analysis based on observations of actual changes. Little is said about what the fishermen have really done in 2011 that could support the entire idea of this analysis, based on other data than proportion landings (e.g. evolution in the number of fishermen in the various gears, in the total fishing effort, in spatial activity, or a survey indicating that some fishers have deliberately changed gear group or strategy etc). Rather, figure 1 doesn’t point at any remarkable changes in trawls and pots landings of sablefish after 2011. So it seems to me that fishermen have not really changed their fishing pattern for sablefish after the introduction of ITQs. Also, the statistical analysis is a GLMM analysis of catch composition of trawl landings. It is not catches so the data before 2011 are biased by the fact that species could be discarded before. Therefore changes in proportions after 2011 may only reflect an increased landing of the bycatch, but no real choices or changes in behavior? This should be hypothesized and discussed.

Globally I think that this overall analysis is too unclear to be accepted in this state, and there are too many doubtful interpretations of what the results really show.

Specific comments

l. 44 – expand a bit more on this statement and give examples

l. 89 – ref to Table 1 is misplaced here as there is nothing about possible costs in this table. I suggest to put this earlier in the middle of the sentence

See above. I think the intro does not fit overly well with the paper. The reader has the feeling that there will be a lot about governance, about how and why fishermen would switch gear etc, whereas this analysis is merely an analysis of CPUE relationships. For example the paragraph lines 100-108 has a lot of statements but the linkages between the goals (why) and the methods (how) do not appear very clear and intuitive for the reader. I suggest to clarify this.

l. 126-128 Nothing is mentioned here on the importance and the development of the trawl fleet

l. 131. the background explains at length that many changes have occurred in management over time, but the analysis is only done on before/after 2011. Why is it so?

l. 139-147. This is confusing for the reader as management for fixed gears and for trawls is explained together even though it is different. And trawls are further explained in the next paragraph. Clarify a bit by describing for each gear sequentially. And in distinct paragraphs.

l. 163 and after. Unclear paragraph. Explain more clearly what is the situation for each gear. Why is it only mentioned the number of vessels for one gear and not for the others? And nothing is said about observed changes from one gear to another following changes in the regulations, whereas this is the main purpose of the paper.

l. 182. It is not said, or unclear, on which years the analysis of fishery-dependent data is performed, and at which temporal scale the data are aggregated and analysed. Trip? Month? Year? What is exactly the dependent variable y, and what is the number of observations? In the text I understand as proportion of species in trawl only, whereas in table 4 it is explained that this is proportion in trawl compared to proportion in pots and lines… I do not really understand this.

Given the size of the regions, it appears difficult to understand why there can be less than 3 vessels in a strata, there are quite many fishermen around there?? And that is the case, the strata should be aggregated to larger areas? Please explain.

chapter 2.4. I am in doubt about the purpose of this part of the analysis. It is said l. 197 that these data are used for most stock assessment, and also l. 203 that the bycatch are overfished, which means that they are assessed. Thus I expect that the procedures for estimating abundance indices for these stocks are already established and performed as part of the stock assessment? So what is the added value of performing this in this article, and why test so many models in this paper? I think this diverts a bit the reader away from the core analysis of the paper, which is the analysis of landings proportions. And does it make sense to obtain different best models (with regards to e.g. interaction between strata and vessels) for different species if they are caught together in the same survey? Furthermore, these analyses are not presented later on in the results.

l. 226 – why not use AIC or BIC? AIC is used later below

l. 237 – define n

l. 241 – why is this mentioned but not investigated?

l. 242 – the dependent variable y is the proportion of total landings caught by trawl gear. Could fixed gears have been included in this analysis, with gear as a fixed effect? And is the total volume of landings varying over time? fishermen do likely not think in terms of proportions but in terms of kilos.

l. 289 – see above. nothing is said in the results about the fitting analysis of the abundance indices and the five models explained in section 2.4. If that is not important, so I think the description of the methods should be adjusted accordingly. This is not well balanced

Figure 4 – the boccacio index in area I is surprising, with such a massive and steep increase in one year in one area and not in the other areas just further North. The validity of this result should be investigated, and discussed

l. 297-301 see comment above. I cannot understand how a grouping of ports can have less than 3 fishing vessels, please explain.

l. 310-311 – what do all these coefficients tell us and why it is important to mention them in the narrative? Please give an interpretation to those or remove from text

l. 332-333. I do not understand this interpretation. If I understand well the statistical analysis interprets the relative weight of target vs. bycatch, and in trawl only, but not that fishermen are increasing their use of fixed gears. It is rather, I guess that “if they would increase their use of fixed gears, they could potentially decrease their realized bycatch of perch”?

l. 341-344. Again, I really do not think that we have investigated gear choice as such, but only the potential of ITQ to reduce bycatch in trawl fishery… There is nothing here that deals with actual decisions made by fishermen to deliberately change gear. I do not see much of the socio-cultural in the analysis. It is actually even unclear to me how and why fishermen could change gear in the real life . If I understand well, in 2011, when ITQ where introduced, it meant that the fixed gear vessels were still fishing with permits and unrestricted landings, while the trawl vessels were given shares. Then a fixed gear would not be able to easily enter the trawl fishery because they have no shares, and meanwhile the trawl vessels have been given an asset, that they may not want to trade against a fixed gear permit, why would they? The basic assumption behind the purpose of this analysis, which is that a fisherman can freely and easily change gear, and thus would do so based on economics and bycatch consideration appears not met to me. And it appears also quite far from how a fisherman is making decision in the real life? At best, here it should not be spoken about “gear choice” but rather as tactical choices within the trawl fishery showing that it is possible to change the catch composition of the trawl fishery?

l. 371-372. This is a rather intuitive finding?

l. 428 – we have only seen proportions, not absolute values. They may have caught more of the other species because they discard less, so the total volume of the landings has increased, for constant volume of sablefish landings?

Figure 1 – is the scale really in 1000 mt?